FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: **MTS-3243US**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5): 09/762380

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP00/03620	**5 June 2000 (05.06.00)**	**7 June 1999 (05.06.99)**

TITLE OF INVENTION

RECORDING AND REPRODUCING APPARATUS, MPEG IMAGE STREAM RECORDING AND REPRODUCING APPARATUS AND MEDIUM

#13

APPLICANT(S) FOR DO/EO/US

Y. Yaguchi et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☒ are transmitted herewith (required only if not transmitted by the International Bureau).
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   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☒ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
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20. ☒ Other items or information:

English translation of the International Search Report dated October 3, 2000

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
	PCT/JP00/03620	MTS-3243US

21. The following fees are submitted:		CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :			
☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO	$970.00		
☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO	$860		
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO	$690.00		
☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)	$670.00		
☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)	$96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =		$860.00	
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CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	120 - 20 =	100	x $18.00	$1,800.00	
Independent claims	12 - 3 =	9	x $80.00	$720.00	
Multiple Dependent Claims (check if applicable).			☒	$270.00	
TOTAL OF ABOVE CALCULATIONS =				$3,650.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).			☐	$0.00	
SUBTOTAL =				$3,650.00	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).			+	$0.00	
TOTAL NATIONAL FEE =				$3,650.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).			☒	$40.00	
TOTAL FEES ENCLOSED =				$3,690.00	
				Amount to be: refunded	$
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☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **18-0350** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Allan Ratner
Ratner & Prestia
P.O. Box 980
Valley Forge, PA 19482
Tel: (610) 407-0700

SIGNATURE

Allan Ratner
NAME

19,717
REGISTRATION NUMBER

February 7, 2001
DATE

FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

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MTS-3243US	09/762380

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PCT/JP00/03620	5 June 2000 (05.06.00)	5 June 1999 (05.06.99)

TITLE OF INVENTION

RECORDING AND REPRODUCING APPARATUS, MPEG IMAGE STREAM RECORDING AND REPRODUCING APPARATUS AND MEDIUM

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Multiple Dependent Claims **(check if applicable).**			☒	**$270.00**	
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	Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).** ☐			**$0.00**	
	SUBTOTAL =			**$3,650.00**	
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☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **18-0350** A duplicate copy of this sheet is enclosed.

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SIGNATURE

Allan Ratner
NAME

19,717
REGISTRATION NUMBER

February 7, 2001
DATE

MTS-3243US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Y. Yaguchi et al.	: Art Unit:
Serial No.:	To Be Assigned	: Examiner:
Filed:	Herewith	:
FOR:	RECORDING AND REPRODUCING APPARATUS, MPEG IMAGE STREAM RECORDING AND REPRODUCING APPARATUS AND MEDIUM	:

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
S I R :

Prior to examination, please amend the above application as follows:

IN THE SPECIFICATION:

After the title and before the first paragraph, please insert --THIS APPLICATION IS A U.S. NATIONAL PHASE APPLICATION OF PCT INTERNATIONAL APPLICATION PCT/JP00/03620--.

On page 2, line 7, please delete "an AV decoder" and insert --a stream decoder--.

On page 4, line 15, please delete "its" and insert --an--.

On page 4, line 21, please delete "To achieve the above object, the 1st invention" and insert --One aspect--.

On page 5, line 7, please delete "I".

On page 5, line 12, please delete "The 2nd invention" and insert --Another aspect--.

On page 6, line 3, please delete "The 3rd invention" and insert --Still another aspect--.

On page 6, line 22, please delete "The 4th invention" and insert --Yet another aspect--.

On page 14, line 5, please delete "Figure 2" and insert --Figure 3--.

On page 16, line 16, please delete "Figure 3" and insert --Figure 4--.

On page 19, line 6, please delete "Figure 4" and insert --Figure 5--.

On page 22, line 10, please delete "Figure 5" and insert --Figure 6--.

On page 22, line 20, please delete "Embodiment 4" and insert --Embodiment 5--.

On page 22, line 27, please delete "means of recording 3" and insert --means of controlling records 2--.

On page 28, line 17, please delete "an MPEG" and insert --an image--.

On page 29, line 2, please delete "Figure 7" and insert --Figure 8--.

On page 29, line 6, please delete "Figure 6" and insert --Figure 7--.

On page 29, line 15, please delete "Embodiment 6" and insert --Embodiment 7--.

On page 31, line 8, please delete "Figure 8" and insert --Figure 9--.

On page 31, line 11, please delete "Figure 6" and insert --Figure 7--.

On page 31, line 12, please delete "Embodiment 6" and insert --Embodiment 8--.

IN THE CLAIMS:

Please amend the claims as follows:

14. (As Amended) The recording and reproducing apparatus according to claim [11 [sic]] 12, characterized in that a cyclic counter value of PSI

or SI added to said means of adding PSI or SI is rewritten in compliance with a cyclic counter value of PSI or SI originally included in said MPEG transport stream so as to keep said continuity.

29. (As Amended) The recording and reproducing apparatus according to any one of claims [1-28] 1-11 and 16-24 having a random access function.

30. (As Amended) A medium having a program and/or data for having all or part of the functions of all or part of the means of the present invention described in any one of claims [1 to 28] 1-11 and 16-24 executed by a computer, characterized by being processible by a computer.

31. (As Amended) An aggregate of information, characterized by being a program and/or data for having all or part of the functions of all or part of the means of the present invention described in any one of claims [1 to 28] 1-11 and 16-24 executed by a computer.

Respectfully submitted,

Allan Ratner, Reg. No. 19,717
Attorney for Applicants

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Dated: February 7, 2001
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The Assistant Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. **18-0350** of any fees associated with this communication.

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I hereby certify that this paper and fee are being deposited, under 37 C.F.R. § 1.10 and with sufficient postage, using the "Express Mail Post Office to Addressee" service of the United States Postal Service on the date indicated above and that the deposit is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Kathleen Libby

Kathleen Libby

SPECIFICATION

RECORDING AND REPRODUCING APPARATUS, MPEG IMAGE STREAM RECORDING AND REPRODUCING APPARATUS AND MEDIUM

TECHNICAL FIELD

The present invention relates to a recording and reproducing apparatus, an MPEG image stream recording and reproducing apparatus and so on.

BACKGROUND ART

Conventionally, a signal compression technology in compliance with the MPEG (Moving Picture Experts Group) standard has been used in various fields and is applied to AV data recording and reproducing apparatus for instance.

Figure 10 (a) is a diagram showing an example of general configuration of a decoder of audio/visual data (hereafter referred to as AV data) compressed in a form of an MPEG transport stream (hereafter referred to as MPEG-TS).

As shown in the diagram, in a stream decoder 100, a transport decoder 110 is means of receiving input of an MPEG-TS. Also, an AV data decoder 120 is means of receiving output from a transport decoder 110, and a frame buffer 130 is means of accessing an AV data decoder 120 and reproducing the AV data in a form capable of displaying on a display unit.

Next, Figure 10 (b) is a diagram showing a procedure for decoding and reproducing an MPEG-TS with time as its horizontal axis, and Figure 11 (a) is a diagram showing a configuration of an MPEG-TS, and Figure 11 (b) is a diagram showing a configuration of an image stream in an AV bit stream. Hereafter, MPEG-TS decoding and reproducing operation by an AV [sic] decoder 100 will be described referring to the drawings.

First, if an MPEG-TS is inputted to the transport decoder 110, the transport decoder 110 detects any PAT from the inputted MPEG-TS as a step shown in (i) of Figure 10 (b). Here, a PAT (Program Association Table) is a packet comprising, in an MPEG-TS, a program number assigned to a program recorded in the MPEG-TS and a PMT (Program Mat Table) showing an ID of a packet for transmitting a stream such as AV data composing the program, and PATs are scattered in an MPEG-TS as shown in Figure 11 (a). Moreover, PMTs also exist as packets in an MPEG-TS.

The transport decoder 110 detects any PAT and then detects any PMT as a step shown in (ii) of Figure 10 (b), and as the case may be, further detects any ID called CAT (Conditional Access Table) concurrently with detection of any PAT and PMT as a step shown in (iii) of Figure 10 (b). While AV data used for pay broadcasting is scrambled so that a general viewer without a special purpose decoder cannot view it, a CAT shows an ID of a packet for transmitting

decoding information for descrambling it, existing as a packet in an MPEG-TS.

The program specification information such as PAT, PMT and CAT is collectively called PSI (Program Specific Information), and so it can be said that operation of transport decoder 110 as shown in (i), (ii) and (iii) of Figure 10 (b) is performing detection of PSI.

An MPEG-TS in which PSI is detected by the transport decoder 110 is inputted as an AV bit stream to the AV data decoder 120. The AV data decoder 120 decodes an image stream from the inputted MPEG-TS. As shown in Figure 11 (b), in an MPEG bit stream, an image stream comprises the image frames of frame I, frame B and frame P, and of these image frames, the frame that must be decoded first is frame I. Thus, as in the steps shown in (iv) of Figure 10 (b) and Figure 11 (b), the AV data decoder 120 first detects a frame I. If the frame I is detected, with the frame I as a starting point, an image stream is decoded from the MPEG-TS (step (v) of the same Figure). The decoded AV data is outputted to a frame buffer.

The frame buffer receives input of AV data from an AV data decoder, and accumulates a certain amount of it (step (vi) of Figure 10 (b)) and then outputs it to a display apparatus such as a display unit.

Incidentally, according to the above operation, it requires two seconds or so from a start of decoding an MPEG transport stream to actual display of AV data. This

is caused by operation for decoding an MPEG-TS into ordinary AV data, and the time can be divided into two as follows. One is the time required for detecting PSI in a transport decoder (PSI waiting time), and the other is the time required for detecting the frame I in an AV decoder (frame I waiting time).

The time required for detecting PSI and the time required for detecting the frame I are felt by a user of an MPEG transport stream reproducing apparatus as waiting time from performing reproducing operation to actually becoming capable of viewing AV data, which has been problematic in terms of convenience.

DISCLOSURE OF THE INVENTION

The present invention was achieved in view of such a problem, and its object is to provide an MPEG transport stream recording and reproducing apparatus and an MPEG image stream recording and reproducing apparatus of which convenience has been improved by shortening the waiting time from actually performing operation for starting reproduction to becoming capable of viewing AV data.

To achieve the above object, the 1st invention of the present invention is a recording and reproducing apparatus, characterized by comprising:

first means of recording for recording a predetermined signal discretely including additional information of a program;

means of controlling records for having said predetermined signal recorded by said first means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said first means of recording;

means of detecting additional information I [sic]for detecting said additional information of a program from said predetermined signal; and

means of adding additional information for adding said additional information to said predetermined signal.

The 2nd invention of the present invention is a recording and reproducing apparatus, characterized by comprising:

first means of recording for recording a predetermined signal discretely including additional information of a program;

means of controlling records for having said predetermined signal recorded by said first means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said first means of recording;

means of detecting PSI or SI for detecting PSI (Program Specific Information) or SI (Service Information) from said predetermined signal; and

means of adding PSI or SI for adding said PSI or SI to said predetermined signal.

The 3rd invention of the present invention is an MPEG image stream recording and reproducing apparatus, comprising:

sixth means of recording for recording an MPEG image stream;

means of controlling records for having said MPEG image stream recorded by said sixth means of recording;

means of controlling reproduction for having said MPEG image stream reproduced from said sixth means of recording;

means of detecting frame I location information for detecting a location of frame I in said MPEG image stream as frame I location information; and

means of managing frame I location information for managing said frame I location information,

characterized in that:

said means of controlling reproduction acquires frame I location information from said means of managing frame I location information and, based on it, reproduces an MPEG image stream having frame I at its head.

The 4th invention of the present invention is a recording and reproducing apparatus, comprising:

first means of recording for recording an MPEG transport stream;

means of controlling records for having said MPEG transport stream recorded by said first means of recording;

means of controlling reproduction for having said MPEG transport stream reproduced from said first means of recording;

means of detecting PCR (Program Clock Reference) from said MPEG transport stream; and

means of adding PCR for adding said PCR to said MPEG transport stream.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 1 of the present invention;

Figure 2 (a) is a diagram showing a configuration of an MPEG-TS processed by an MPEG transport stream recording and reproducing apparatus of the present invention;

Figure 2 (b) is a diagram showing a configuration of an image stream processed by an MPEG image stream recording and reproducing apparatus of the present invention;

Figure 3 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 2 of the present invention;

Figure 4 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 3 of the present invention;

Figure 5 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 4 of the present invention;

Figure 6 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 5 of the present invention;

Figure 7 is a diagram showing a configuration of an MPEG image stream recording and reproducing apparatus according to Embodiment 6 of the present invention;

Figure 8 is a diagram showing a configuration of an MPEG image stream recording and reproducing apparatus according to Embodiment 7 of the present invention;

Figure 9 is a diagram showing a configuration of an MPEG image stream recording and reproducing apparatus according to Embodiment 8 of the present invention;

Figure 10 (a) is a diagram showing a configuration of a stream decoder by a conventional technology;

Figure 10 (b) is a flowchart showing how an MPEG-TS is decoded by an AV data decoder;

Figure 11 (a) is a diagram showing a configuration of an MPEG-TS processed on a stream decoder;

Figure 11 (b) is a diagram showing a configuration of an image stream processed on a stream decoder;

Figure 12 is a diagram showing existence of PCR in an MPEG transport stream; and

Figure 13 is a diagram showing existence of SI in an MPEG transport stream.

DESCRIPTION OF SYMBOLS

1 Means of detecting PSI or SI

2 Means of controlling records

3 Means of recording

4 Means of controlling reproduction

5 Means of adding PSI or SI

6 Means of managing PSI or SI location information

10, 20, 30, 40, 50 MPEG transport stream recording and reproducing apparatus

11 Means of detecting frame I location information

12 Means of managing frame I location information

13 Means of reading frame I location information

60, 70, 80 Image stream recording and reproducing apparatuses

100 Stream decoder

110 Transport decoder

120 AV data decoder

130 Frame buffer

BEST MODE FOR CARRYING OUT THE INVENTION

Hereafter, Embodiments of the present invention will be described.

(Embodiment 1)

Figure 1 is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 1 of the present invention. As shown in the diagram, in the MPEG transport stream recording and reproducing apparatus 10, means of detecting PSI 1 and means of controlling records 2 are means of directly

receiving input of an MPEG transport stream (MPEG-TS). Also, means of recording 3 is means of recording an MPEG-TS under control of means of controlling records 2, and has a random access function such as an HDD. Means of controlling reproduction 4 is means of reproducing an MPEG-TS recorded in means of recording 3. In addition, means of adding PSI 5 is means of receiving input from means of detecting PSI 1 and means of controlling reproduction 4 and outputting an MPEG-TS to the outside of MPEG transport stream recording and reproducing apparatus 10.

This Embodiment 1 of the present invention having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an MPEG-TS, an MPEG-TS is inputted from the outside, and then the MPEG-TS is inputted to both means of detecting PSI 1 and means of controlling records 2. On receipt of input of the MPEG-TS, means of controlling records 2 records it in means of recording 3. The MPEG-TS is saved as accumulated data in means of recording 3.

On the other hand, on receipt of input of the MPEG-TS, means of detecting PSI 1 detects any PAT, PMT and CAT that are the packets comprising PSI from each of the packets comprising the MPEG-TS, and records them as PSI data. Here, the PSI data is the packets comprising the PSI data arranged as one in predetermined order such as a PAT first, a PMT

next and a CAT at last. Moreover, at the time of detecting the PSI data, means of detecting PSI 1 also concurrently detects values of cyclic counters held by the PAT, PMT and CAT respectively. Here, the cyclic counters are data to which values of 0 to 15 are given in various packets comprising an MPEG-TS including a PAT, a PMT and a CAT, and the MPEG-TS is reproduced by consecutively detecting these values.

Thus, in recording operation, an MPEG-TS is recorded in means of recording 3 and PSI data is recorded in means of detecting PSI 1 respectively.

Next, a reproducing operation will be described. Means of controlling reproduction 4 reads an MPEG-TS recorded in means of recording 3 and outputs it to means of adding PSI 5. Also, means of detecting PSI 1 outputs PSI data to means of adding PSI 5.

On receipt of input of the MPEG-TS from means of controlling reproduction 4 and the PSI data from means of detecting PSI 1 respectively, means of adding PSI 5 adds the PSI data to the head of the MPEG-TS. At this time, means of adding PSI 5 performs addition by processing the values of cyclic counters of the PAT, PMT and CAT comprising the PSI data so that they keep continuity with the values of cyclic counters of the PAT, PMT and CAT comprising the PSI detected earlier.

The MPEG-TS of which head PSI data is added to as above is outputted to the outside of MPEG transport stream recording and reproducing apparatus 10.

A reproduced MPEG-TS is decoded by a conventional MPEG-TS decoder, and at that time, as shown in Fig 2 (a), a PAT, a PMT and a CAT that are PSI are given in the form of PSI data to the head of the MPEG-TS, and so the decoder processes such data first. Therefore, the decoder does not need to perform operation for detecting any PMT, PAT and so on so that the time therefore is saved.

Thus, at the time of recording an MPEG-TS, an MPEG transport stream recording and reproducing apparatus of this Embodiment 1 detects PSI included in an MPEG-TS to be recorded as PSI data in advance and at the time of reproduction, adds it to the head of the MPEG-TS to be reproduced so as to allow time for preparation required for reproduction to be shortened as a whole by omitting operation for detection of PSI by the decoder on decoding.

Moreover, while the above description was given on the assumption that the packets of the PAT, PMT and CAT comprising PSI are single packet respectively, there are also cases where a PAT, a PMT and a CAT are comprised of a plurality of packets respectively. In this case, on detecting PSI, means of detecting PSI 1 detects values of cyclic counters of the PAT, PMT and CAT concurrently with order of arrangement of the plurality of packets, and means of adding PSI 5 performs addition to the MPEG-TS

so that the order of arrangement of the packets keeps continuity as with the values of cyclic counters.

Moreover, as for a method of keeping continuity of values of cyclic counters, it is also possible to rewrite the values of cyclic counters of the PSI data to be added in accordance with the values of cyclic counters of the PSI originally included in the MPEG-TS, or to replace respective PSI originally included in the MPEG-TS in accordance with the values of cyclic counters of the PSI data to be added. Especially, this rewriting is implemented by replacing every PSI included in the original MPEG-TS with said PSI data of which values of cyclic counters are consecutively changed.

(Embodiment 2)

Figure 2 [sic] is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 2. As shown in the diagram, in the MPEG transport stream recording and reproducing apparatus 20 wherein the same numbers as Figure 1 indicate the same divisions, means of detecting PSI 1 is provided on a reproduction side, and means of controlling reproduction 4 outputs to both means of adding PSI 5 and means of detecting PSI 1, and means of adding PSI 5 receives input from means of controlling reproduction 4 and means of detecting PSI 1.

This Embodiment 2 having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an MPEG-TS, an MPEG-TS is inputted from the outside, and then the MPEG-TS is inputted to means of controlling records 2. On receipt of input of the MPEG-TS, means of controlling records 2 records it in means of recording 3. Similarly as Embodiment 1, the MPEG-TS is saved as accumulated data in means of recording 3.

Next, reproducing operation will be described. Means of controlling reproduction 4 reads an MPEG-TS recorded in means of recording 3 and outputs it to means of adding PSI 5 and means of detecting PSI 1.

On receipt of input of the MPEG-TS, just as in Embodiment 1 to be implemented hereafter, means of detecting PSI 1 detects PSI as PSI data together with its values of cyclic counters and outputs them to means of adding PSI 5.

On receipt of input of the MPEG-TS from means of controlling reproduction 4 and the PSI data from means of detecting PSI 1 respectively, means of adding PSI 5 adds the PSI data to the head of the MPEG-TS so that continuity of the values of cyclic counters is kept and outputs them to the outside of MPEG transport stream recording and reproducing apparatus 10.

Thus, an MPEG transport stream recording and reproducing apparatus of this Embodiment 2 detects PSI included in an MPEG-TS as PSI data when reproducing the

MPEG-TS and adds it to the head of the MPEG-TS so as to allow time for preparation required for reproduction of the MPEG-TS to be shortened as a whole by eliminating the need to record PSI data from means of detecting PSI.

Moreover, as in this embodiment 1, while the above description was given on the assumption that the packets of the PAT, PMT and CAT comprising PSI are single packet respectively, there are also cases where a PAT, a PMT and a CAT are comprised of a plurality of packets respectively. In this case, on detecting PSI, means of detecting PSI 1 detects values of cyclic counters of the PAT, PMT and CAT concurrently with order of arrangement of the plurality of packets, and means of adding PSI 5 performs addition to the MPEG-TS so that the order of arrangement of the packets keeps continuity as with the values of cyclic counters.

Moreover, as for a method of keeping continuity of values of cyclic counters, it is also possible to rewrite the values of cyclic counters of the PSI data to be added in accordance with the values of cyclic counters of the respective PSI originally included in the MPEG-TS, or to replace respective PSI originally included in the MPEG-TS in accordance with the values of cyclic counters of the PSI data to be added.

(Embodiment 3)

Figure 3 [sic] is a diagram showing a configuration of an MPEG transport stream recording and reproducing

apparatus according to Embodiment 3. As shown in the diagram, in MPEG transport stream recording and reproducing apparatus 30 wherein the same numbers as Figure 1 indicate the same divisions, means of adding PSI 5 is means of receiving input from means of detecting PSI 1 and outputting PSI data to means of controlling records 2.

This Embodiment 3 having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an MPEG-TS, an MPEG-TS is inputted from the outside, and then the MPEG-TS is inputted to both means of detecting PSI 1 and means of controlling records 2.

Next, on receipt of input of the MPEG-TS, means of detecting PSI 1 detects from each of the packets comprising it PSI together with its values of cyclic counters and outputs it as PSI data to means of adding PSI 5. On receipt of input of the PSI data, means of adding PSI 5 outputs it to means of controlling records 2 and adds the PSI data to the head of the MPEG-TS in means of controlling records 2 so that continuity of the values of cyclic counters is kept with the MPEG-TS inputted so far.

Means of controlling records 2 receives input of the MPEG-TS to which PSI data inputted from means of adding PSI 6 is added. More specifically, means of controlling

records 2 records in means of recording 3 the MPEG-TS of which head the PSI data is added to.

Next, as for reproducing operation, as with a conventional MPEG-TS recording and reproducing apparatus, it is performed by reading an MPEG-TS from means of recording 3 under control of means of controlling reproduction 4. However, the MPEG-TS recorded in means of recording 3 has already PSI data given to its head, so no redundant operation for detecting PSI is performed on decoding, as in Embodiments 1 and 2.

Thus, this Embodiment 3 allows time for preparation required for reproduction to be shortened as a whole by omitting operation for detecting PSI by the decoder on decoding.

In addition, it also allows reduction of a burden of processing on the apparatus on reproduction by adding PSI data in advance at the stage of the MPEG-TS to be stored in means of recording 3.

Moreover, as in this Embodiment 1, while the above description was given on the assumption that the packets of the PAT, PMT and CAT comprising PSI are single packet respectively, there are also cases where a PAT, a PMT and a CAT are comprised of a plurality of packets respectively. In this case, on detecting PSI, means of detecting PSI 1 detects values of cyclic counters of the PAT, PMT and CAT concurrently with order of arrangement of the plurality of packets, and means of adding PSI 5 performs addition

to the MPEG-TS so that the order of arrangement of the packets keeps continuity as with the values of cyclic counters.

Furthermore, as for a method of keeping continuity of values of cyclic counters, it is also possible to rewrite the values of cyclic counters of the PSI data to be added in accordance with the values of cyclic counters of the respective PSI originally included in the MPEG-TS, or to replace respective PSI originally included in the MPEG-TS in accordance with the values of cyclic counters of the PSI data to be added. Especially, this rewriting is implemented by replacing every PSI included in the original MPEG-TS with said PSI data of which values of cyclic counters are consecutively changed.

(Embodiment 4)

Figure 4 [sic] is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 4 of the present invention. As shown in the diagram, in MPEG transport stream recording and reproducing apparatus 40 wherein the same symbols as Figure 1 indicate the same divisions, means of managing PSI location information 6 is means placed between means of detecting PSI 1 and means of controlling reproduction 4.

This Embodiment 4 having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an MPEG-TS, an MPEG-TS is inputted from the outside, and then the MPEG-TS is inputted to both means of detecting PSI 1 and means of controlling records 2.

Next, on receipt of input of the MPEG-TS, means of detecting PSI 1 detects from each of the packets comprising it PSI together with its values of cyclic counters and outputs it as PSI data to means of controlling records 2.

On receipt of input of the MPEG-TS and the PSI data, means of controlling records 2 stores them in means of recording 3. At that time, means of managing PSI location information 6 accesses means of controlling records 2 and acquires as PSI location information a location in the means of recording where means of controlling records 2 has recorded the PSI data.

In the above recording operation, the MPEG-TS and the PSI data are stored in means of recording 3, and PSI location information is stored in means of managing PSI location information 6.

Next, reproducing operation will be described. Means of controlling reproduction 4 reads an MPEG-TS and PSI data recorded in means of recording 3. However, at this stage, the MPEG-TS and PSI data are outputted as uniform digital data without distinguishing their contents.

Next, means of managing PSI location information 6 accesses means of controlling reproduction 4 and detects a location, based on PSI location information, where the PSI data is recorded from digital data being processed in means of controlling reproduction 4. And then, upon detection of the location of the PSI data, means of managing PSI location information 6 fetches the PSI data from the location and adds it to the head of the MPEG-TS in the original digital data so that continuity of the values of cyclic counters is kept so as to become a transport stream in continuity with the MPEG-TS inputted so far.

Lastly, means of controlling reproduction 4 outputs the MPEG-TS of which head the PSI data is added to and of which data is partly changed to the outside of MPEG transport stream recording and reproducing apparatus 10.

Thus, at the time of reproducing the MPEG-TS, an MPEG transport stream recording and reproducing apparatus of this Embodiment 4 detects PSI included in an MPEG-TS as PSI data and adds it to the head of the MPEG-TS so that it allows time for preparation required for reproduction of the MPEG-TS to be shortened as a whole by eliminating the need to record PSI data from means of detecting PSI, and it also allows convenience of data management to be improved by having the PSI data recorded in the means of recording.

Moreover, as in Embodiment 1 of the present invention, while the above description was given on the assumption

that the packets of the PAT, PMT and CAT comprising PSI are single packet respectively, there are also cases where a PAT, a PMT and a CAT are comprised of a plurality of packets respectively. In this case, on detecting PSI, means of detecting PSI 1 detects values of cyclic counters of the PAT, PMT and CAT concurrently with order of arrangement of the plurality of packets, and means of managing PSI location information 6 performs addition to the MPEG-TS so that the order of arrangement of the packets keeps continuity as with the values of cyclic counters.

Furthermore, as for a method of keeping continuity of values of cyclic counters, it is also possible to rewrite the values of cyclic counters of the PSI data to be added in accordance with the values of cyclic counters of the respective PSI originally included in the MPEG-TS, or to replace the respective PSI originally included in the MPEG-TS in accordance with the values of cyclic counters of the PSI data to be added.

(Embodiment 5)

Figure 5 [sic] is a diagram showing a configuration of an MPEG transport stream recording and reproducing apparatus according to Embodiment 5 of the present invention. As shown in the diagram, in MPEG transport stream recording and reproducing apparatus 50 wherein the same symbols as Figure 1 and Figure 4 indicate the same divisions, means of detecting PSI 1 and means of managing PSI location information 6 are connected to create a route

different from that of an MPEG-TS between means of recording 3 and means of controlling reproduction 4.

This Embodiment 4 [sic] having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an MPEG-TS, an MPEG-TS is inputted from the outside, and then the MPEG-TS is inputted to means of controlling records 2. On receipt of input of the MPEG-TS, means of recording 3 [sic] records it in means of recording 3. Operation up to this point is the same as that of a conventional MPEG-TS recording and reproducing apparatus.

Next, means of detecting PSI 1 accesses means of recording 3 and detects from the MPEG-TS stored in the means of recording 3 PSI together with its values of cyclic counters and writes them as PSI data to means of recording 3, and also detects a location in the means of recording 3 where the PSI data is stored, and then inputs this location as PSI location information in means of managing PSI location information 6. The means of managing PSI location information stores the inputted PSI location information.

Next, reproducing operation will be described. Means of controlling reproduction 4 reads an MPEG-TS recorded in means of recording 3. On the other hand, means of managing PSI location information 6 accesses means of reproducing 3 and detects a location, based on PSI location information, where the PSI data is recorded from the MPEG-TS

being processed in means of controlling reproduction 4, and then fetches the PSI data from the location and adds it to the head of the MPEG-TS in the original digital data so that continuity of the values of cyclic counters is kept so as to become a transport stream in continuity with the MPEG-TS inputted so far.

Lastly, means of controlling reproduction 4 outputs the MPEG-TS of which head the PSI data is added to and of which data is thus partly corrected to the outside of MPEG transport stream recording and reproducing apparatus 10.

Thus, at the time of reproducing an MPEG-TS, an MPEG transport stream recording and reproducing apparatus of this Embodiment 5 detects PSI included in the MPEG-TS as PSI data and adds it to the head of the MPEG-TS so that it allows time for preparation required for reproduction of the MPEG-TS to be shortened as a whole by eliminating the need to record PSI data from means of detecting PSI, and it also allows operation for detecting PSI to be performed separately from recording and reproducing, that is, independently from operation of means of controlling records 2 and means of controlling reproduction 4.

Moreover, similarly as Embodiment 4 of the present invention, while the above description was given on the assumption that the packets of the PAT, PMT and CAT comprising PSI are single packet respectively, there are also cases where a PAT, a PMT and a CAT are comprised of

a plurality of packets respectively. In this case, on detecting PSI, means of detecting PSI 1 detects values of cyclic counters of the PAT, PMT and CAT concurrently with order of arrangement of these plurality of packets, and means of managing PSI location information 6 performs addition to the MPEG-TS so that the order of arrangement of the packets keeps continuity as with the values of cyclic counters.

Furthermore, as for a method of keeping continuity of values of cyclic counters, it is also possible to rewrite the values of cyclic counters of the PSI data to be added in accordance with the values of cyclic counters of the respective PSI originally included in the MPEG-TS, or to replace the respective PSI originally included in the MPEG-TS in accordance with the values of cyclic counters of the PSI data to be added.

Incidentally, while an MPEG transport stream is selected as a subject signal of recording and reproducing in the above Embodiments 1 to 5, a subject signal for recording and reproducing of the present invention can be in short any predetermined signal, not limited thereto, in which additional information of a program is discretely included such as DSS (a format used for digital TV in the U.S.A.).

In addition, while the above Embodiments 1 to 5 are explained by taking an MPEG transport stream including PSI as an example, the above Embodiments 1 to 5 are also

applicable in the case where PCR (Program Clock Reference) is handled in place of PSI (see Figure 12). Drawings and description of Embodiments using the PCR are omitted since they are easily understood by replacing PSI with PCR in the respective drawings and corresponding description in the above Embodiments 1 to 5.

Moreover, while the above Embodiments 1 to 5 are explained by taking an MPEG transport stream including PSI as an example, the above Embodiments 1 to 5 are also applicable in the case where SI (Service Information) is handled in place of PSI (see Figure 13). Drawings and description of Embodiments using the SI are omitted since they are easily understood by replacing PSI with SI in the respective drawings and corresponding description in the above Embodiments 1 to 5.

(Embodiment 6)

Figure 6 is a diagram showing a configuration of an image stream recording and reproducing apparatus according to Embodiment 6 of the present invention. As shown in the diagram, in MPEG image stream recording and reproducing apparatus 60, means of detecting frame I location information 11 and means of controlling records 2 are means of directly receiving input of an image stream. Also, means of recording 3 is means of recording an image stream under control of means of controlling records 2, means of controlling reproduction 4 is means of reproducing an image stream recorded in means of recording 3, and means

of managing frame I location information 12 is means of receiving input from means of detecting frame I location information 11 and means of controlling records 2 and outputting an image stream to the outside of image stream recording and reproducing apparatus 60.

This Embodiment 6 having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an image stream, an image stream is inputted from the outside, and then the image stream is inputted to both means of detecting frame I location information 11 and means of controlling records 2. On receipt of input of the image stream, means of controlling records 2 records it in means of recording 3. The image stream is saved as accumulated data in means of recording 3.

On the other hand, on receipt of input of the image stream, means of detecting frame I location information 11 detects any location of frame I in this image stream, and inputs it as frame I location information in means of managing frame I location information 12.

On receipt of input of the frame I location information from means of detecting frame I location information 11, the means of managing frame I location information acquires it and information from means of controlling records 2 so as to detect where said frame I location information is located in image data stored in means of recording 3

and manage the storage location of the frame I location information in this means of recording 3.

Thus, in recording operation, an image stream is recorded in means of recording 3 and a storage location of frame I location information on means of recording 3 is recorded in means of managing frame I location information 12 respectively.

Next, reproducing operation will be described. Means of controlling reproduction 4 reads an image stream recorded in means of recording 3. Means of controlling reproduction 4 further acquires the storage location of frame I location information managed by means of detecting frame I location information 11 to detect the location of frame I from the image stream inputted from means of recording 3 and output the image stream headed with the frame I to the outside of image stream recording and reproducing apparatus 60.

While the reproduced image stream is decoded by a conventional image stream decoder, as shown in Figure 2 (b), at this time, an image stream processed by image stream recording and reproducing apparatus 60 is inputted with frame I at its head to the decoder so that operation for detection of frame I by the decoder will be omitted.

Thus, on recording an image stream, an MPEG [sic] transport stream recording and reproducing apparatus of this Embodiment 6 detects any frame I included in an image stream to be recorded as frame I location information in

advance, and on reproduction, outputs the image stream headed with this frame I so as to allow time for preparation required for reproduction to be shortened as a whole by omitting operation for detection of frame I by the decoder on decoding.

(Embodiment 7)

Figure 7 [sic] is a diagram showing a configuration of an image stream recording and reproducing apparatus of Embodiment 7 of the present invention. As shown in the diagram, in an image stream recording and reproducing apparatus 70, the same symbols as Figure 6 [sic] are the same divisions or the same means. Means of detecting frame I location information 11 and means of controlling records 2 are means of directly receiving input of an image stream, and means of detecting frame I location information 11 is further means of inputting to means of controlling records 2, and means of reading frame I location information 13 is means of accessing means of recording 3 and also inputting to means of controlling reproduction 4.

This Embodiment 6 [sic] having the above configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an image stream, an image stream is inputted from the outside, and then the image stream is inputted to both means of detecting frame I location information 11 and means of controlling records 2.

Next, on receipt of input of the image stream, means of detecting frame I location information 11 detects any location of frame I in the image data, and inputs it as frame I location information to means of controlling records 2.

On receipt of input of the image stream and the above frame I location information, means of controlling records 2 records them both in means of recording 3. The image stream and the frame I location information are stored as accumulated data in means of recording 3.

Next, reproducing operation will be described. Means of controlling reproduction 4 reads the image stream recorded in means of recording 3.

On the other hand, means of reading frame I location information 13 also accesses means of recording 3 and acquires frame I location information and then outputs it to means of controlling reproduction 4.

On receipt of input of the above frame I location information, based on it, means of controlling reproduction 4 detects any location of frame I from the image stream read from means of recording 3, and outputs the image stream headed with the frame I to the outside of image stream recording and reproducing apparatus 70.

While the reproduced image stream is decoded by a conventional image stream decoder, as in Embodiment 6, the image stream is inputted with frame I at its head to

the decoder so that operation for detection of frame I by the decoder will be omitted.

Thus, on recording an image stream, an image stream recording and reproducing apparatus of this Embodiment 7 detects any frame I included in an image stream to be recorded as frame I location information in advance and records it in means of recording, and then reproduces the frame I location information and the image stream so that the image stream headed with frame I is outputted so as to allow time for preparation required for reproduction to be shortened as a whole by omitting operation for detection of frame I by the decoder on decoding.

(Embodiment 8)

Figure 8 [sic] is a diagram showing a configuration of an image stream recording and reproducing apparatus of Embodiment 8 of the present invention. As shown in the diagram, the same symbols as Figure 6 [sic] are the same divisions or the same means. This Embodiment 6 [sic] having such configuration will be described next.

First, recording operation will be described. If means of controlling records 2 starts operation for recording an image stream, an image stream is inputted from the outside, and then the image stream is inputted to both means of detecting frame I location information 11 and means of controlling records 2.

On receipt of input of the image stream, means of detecting frame I location information 11 detects any

location of frame I from this image stream as frame I location information, generates a recording start signal including this frame I location information and inputs it to means of controlling records 2.

On the other hand, on receipt of input of the image stream and the recording start signal, based on the frame I location information included in the recording start signal, means of controlling records 2 detects any frame I from the inputted image stream and records any image stream including and after this frame I in means of recording 3. Also, means of controlling records 2 abandons any image stream before the above frame I and does not record it in means of recording 3.

Thus, in recording operation, any image stream including and after the frame I detected by means of detecting frame I location information is stored in means of recording 3.

Next, while reproducing operation and decoding will be performed as with a conventional image stream recording and reproducing apparatus, as in these Embodiments 6 and 7, the image stream is configured by frame I at its head so that operation for detection of frame I by the decoder will be omitted.

Thus, on recording an image stream, an image stream recording and reproducing apparatus of this Embodiment 8 detects any frame I included in an image stream to be recorded as frame I location information in advance and

records the image stream headed with frame I on recording so as to allow time for preparation required for reproduction to be shortened as a whole by omitting operation for detection of frame I by the decoder on decoding.

Moreover, while an MPEG transport stream recording and reproducing apparatus for detecting PSI and an MPEG image stream recording and reproducing apparatus for detecting frame I are described as separate apparatuses respectively in the Embodiments of the present invention, each of these Embodiments may also be configured by having means of recording 3 in common and arbitrarily combining the divisions and the means, and in that case, the time required for decoding an MPEG-TS can be further shortened.

Furthermore, in the Embodiments of the present invention, while it is described that operation of means of detecting PSI 1, means of controlling records 2, means of controlling reproduction 4, means of adding PSI 5, means of detecting frame I location information 11, means of managing frame I location information 12 and means of reading frame I location information 13 is implemented by means of hardware, it may also be implemented by means of software, that is, by using a computer and operating a program.

Also, while the Embodiments of the present invention are described centering on an MPEG transport stream recording and reproducing apparatus or an MPEG image stream

recording and reproducing apparatus thereof, the present invention is a medium having a program and/or data for having all or part of the functions of all or part of the means of the above-mentioned present invention executed by a computer, wherein said program and/or data readable and read by a computer perform said functions in cooperation with said computer.

The data in this case includes data structures, data formats, data types and so on.

A medium includes, for instance, a record medium such as ROM, a transmission medium such as the Internet, or a transmission medium such as light, radio wave or a sound wave.

A medium having something includes, for instance, a record medium recording a program and/or data or a transmission medium transmitting a program and/or data.

Processible by computer means, for instance, in the case of a record medium such as ROM, that it is readable by a computer, and in the case of a transmission medium, its meaning includes that a program and/or data to be transmitted can be handled by a computer as a result of transmission.

An information aggregate includes, for instance, software such as a program and/or data.

INDUSTRIAL APPLICABILITY

As it is apparent from the above description, the present invention allows high-speed reproduction of data by omitting the time for detecting PSI or PCR on decoding.

The present invention also allows high-speed reproduction of data by omitting the time for detecting frame I on decoding.

CLAIMS

1. (Amended) A recording and reproducing apparatus, characterized by comprising:

first means of recording for recording a predetermined signal discretely including additional information of a program;

means of controlling records for having said predetermined signal recorded by said first means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said first means of recording;

means of detecting additional information for detecting said additional information of a program from said predetermined signal; and

means of adding additional information for adding said additional information to said predetermined signal.

2. A recording and reproducing apparatus, characterized by comprising:

first means of recording for recording a predetermined signal discretely including additional information of a program;

means of controlling records for having said predetermined signal recorded by said first means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said first means of recording;

means of detecting PSI or SI for detecting PSI (Program Specific Information) or SI (Service Information) from said predetermined signal; and

means of adding PSI or SI for adding said PSI or SI to said predetermined signal.

3. The recording and reproducing apparatus according to claim 2, characterized in that said predetermined signal is an MPEG transport stream.

4. The recording and reproducing apparatus according to claim 3, characterized in that:

said means of detecting PSI or SI detects PSI or SI on recording an MPEG transport stream; and

on reproducing an MPEG transport stream, said means of adding PSI or SI acquires PSI or SI from said means of detecting PSI or SI and adds the PSI or SI to the head of an MPEG transport stream reproduced from said first means of recording.

5. The recording and reproducing apparatus according to claim 3 characterized in that:

said means of detecting PSI or SI detects PSI or SI on reproducing an MPEG transport stream; and

on reproducing an MPEG transport stream, said means of adding PSI or SI acquires PSI or SI from said means of detecting PSI or SI and adds the PSI or SI to the head

of an MPEG transport stream outputted by said means of controlling reproduction.

6. A recording and reproducing apparatus, comprising:

second means of recording for recording a predetermined signal discretely including additional information of a program;

means of controlling records for having said predetermined signal recorded by said second means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said second means of recording; and

means of detecting PSI or SI for detecting PSI or SI from said predetermined signal;

characterized in that on recording said predetermined signal, said means of detecting PSI or SI detects PSI or SI from said predetermined signal and adds it to the head of the predetermined signal; and

said second means of recording records said predetermined signal having PSI or SI added to its head.

7. The recording and reproducing apparatus according to claim 6, characterized in that said predetermined signal is an MPEG transport stream.

8. A recording and reproducing apparatus, comprising:

means of detecting PSI or SI for detecting PSI or SI from a predetermined signal discretely including additional information of a program;

third means of recording for recording said predetermined signal and said PSI or SI;

means of controlling records for having said predetermined signal and said PSI or SI recorded by said third means of recording;

means of controlling reproduction for having said predetermined signal and said PSI or SI reproduced from said third means of recording; and

means of managing PSI or SI location information for managing a location on said third means of recording where said PSI or SI is recorded as PSI or SI location information,

characterized in that:

on recording said predetermined signal, said means of detecting PSI or SI detects PSI or SI; and

on recording said predetermined signal, said means of managing PSI or SI location information acquires PSI or SI location information from said means of controlling records, and on reproducing said predetermined signal, based on said PSI or SI location information, adds the PSI or SI to the head of the predetermined signal reproduced by said means of controlling reproduction.

9. The recording and reproducing apparatus according to claim 8 characterized in that said predetermined signal is an MPEG transport stream.

10. A recording and reproducing apparatus, comprising:

means of detecting PSI or SI for detecting PSI or SI from a predetermined signal discretely including additional information of a program;

fifth means of recording for recording said predetermined signal and said PSI or SI;

means of controlling records for having said predetermined signal recorded by said fifth means of recording;

means of controlling reproduction for having said predetermined signal reproduced from said fifth means of recording; and

means of managing PSI or SI location information for managing a location where said PSI or SI is recorded as PSI or SI location information,

characterized in that:

said means of detecting PSI or SI detects PSI or SI from said predetermined signal recorded in said fifth means of recording and makes it recorded by said fifth means of recording; and

on reproducing said predetermined signal, based on said PSI or SI location information, said means of managing PSI or SI location information adds the PSI or SI to the head of said predetermined signal reproduced by said means of controlling reproduction.

11. The recording and reproducing apparatus according to claim 10, characterized in that said predetermined signal is an MPEG transport stream.

12. The recording and reproducing apparatus according to claim 3, 7, 9 or 11, characterized in that said PSI or SI has a cyclic counter value, and a cyclic counter value of PSI or SI added to said MPEG transport stream keeps continuity with a cyclic counter value of PSI or SI included in said MPEG transport stream.

13. The recording and reproducing apparatus according to claim 3, 7, 9 or 11, characterized in that said MPEG transport stream to which PSI or SI is added has its contents rewritten.

14. The recording and reproducing apparatus according to claim 11 [sic], characterized in that a cyclic counter value of PSI or SI added to said means of adding PSI or SI is rewritten in compliance with a cyclic counter value of PSI or SI originally included in said MPEG transport stream so as to keep said continuity.

15. The recording and reproducing apparatus according to claim 13, characterized in that a cyclic counter value of PSI or SI originally included in said MPEG transport stream is replaced in compliance with a cyclic counter value of PSI or SI added to said means of adding PSI or SI so as to keep said continuity.

16. An MPEG image stream recording and reproducing apparatus, comprising:

sixth means of recording for recording an MPEG image stream;

means of controlling records for having said MPEG image stream recorded by said sixth means of recording;

means of controlling reproduction for having said MPEG image stream reproduced from said sixth means of recording;

means of detecting frame I location information for detecting a location of frame I in said MPEG image stream as frame I location information; and

means of managing frame I location information for managing said frame I location information,

characterized in that:

said means of controlling reproduction acquires frame I location information from said means of managing frame I location information and, based on it, reproduces an MPEG image stream having frame I at its head.

17. An MPEG image stream recording and reproducing apparatus, comprising:

means of detecting frame I location information for detecting a location of frame I in an MPEG image stream as frame I location information;

seventh means of recording for recording said MPEG image stream and said frame I location information;

means of controlling records for having said MPEG image stream and said frame I location information recorded by said seventh means of recording;

means of controlling reproduction for having said MPEG image stream reproduced from said seventh means of recording;

means of managing frame I location information for managing a location on said seventh means of recording where said frame I location information is recorded as management information; and

means of reading frame I location information for reading said frame I location information based on said management information,

characterized in that:

on reproducing an MPEG image stream, said means of reading frame I location information reads said frame I location information from said seventh means of recording and outputs it to said means of controlling reproduction; and

based on said frame I location information, said means of controlling reproduction reproduces image data in the MPEG image stream having frame I at its head.

18. An MPEG image stream recording and reproducing apparatus, comprising:

eighth means of recording for recording an MPEG image stream;

means of controlling records for having said MPEG image stream recorded by said eighth means of recording;

means of controlling reproduction for having said MPEG image stream reproduced from said eighth means of recording; and

means of detecting frame I location information for detecting a location of frame I in said MPEG image stream as frame I location information,

characterized in that said means of controlling records acquires frame I location information from said means of managing frame I location information and, based on it, abandons any image stream before the frame I and makes the MPEG image stream recorded by said eighth means of recording.

19. A recording and reproducing apparatus, comprising:

first means of recording for recording an MPEG transport stream;

means of controlling records for having said MPEG transport stream recorded by said first means of recording;

means of controlling reproduction for having said MPEG transport stream reproduced from said first means of recording;

means of detecting PCR (Program Clock Reference) from said MPEG transport stream; and

means of adding PCR for adding said PCR to said MPEG transport stream.

20. The recording and reproducing apparatus according to claim 19, characterized in that:

said means of detecting PCR detects PCR on recoding an MPEG transport stream; and

on reproducing an MPEG transport stream, said means of adding PCR acquires PCR from said means of recording PCR and adds the PCR to the head of an MPEG transport stream reproduced from said first means of recording.

21. The recording and reproducing apparatus according to claim 19, characterized in that:

said means of detecting PCR detects PCR on reproducing an MPEG transport stream; and

on reproducing an MPEG transport stream, said means of adding PCR acquires PCR from said means of detecting PCR and adds the PCR to the head of an MPEG transport stream outputted by said means of controlling reproduction.

22. A recording and reproducing apparatus, comprising:

second means of recording for recording an MPEG transport stream;

means of controlling records for having said MPEG transport stream recorded by said second means of recording;

means of controlling reproduction for having said MPEG transport stream reproduced from said second means of recording; and

means of detecting PCR for detecting PCR from said MPEG transport stream,

characterized in that:

on recording said MPEG transport stream, said means of detecting PCR detects PCR from the MPEG transport stream and adds it to the head of the MPEG transport stream; and

said second means of recording records said MPEG transport stream having PCR added to its head.

23. A recording and reproducing apparatus, comprising:

means of detecting PCR for detecting PCR from an MPEG transport stream;

third means of recording for recording said MPEG transport stream and said PCR;

means of controlling records for having said MPEG transport stream and said PCR recorded by said third means of recording;

means of controlling reproduction for having said MPEG transport stream and said PCR reproduced from said third means of recording; and

means of managing PCR location information for managing a location on said third means of recording where said PCR is recorded as PCR location information,

characterized in that:

said means of detecting PCR detects PCR on recording said MPEG transport stream; and

on recording said MPEG transport stream, said means of managing PCR location information acquires said PCR location information from said means of controlling records; and

on reproducing said MPEG transport stream, based on said PCR location information, adds the PCR to the head of the MPEG transport stream reproduced by said means of controlling reproduction.

24. A recording and reproducing apparatus, comprising:

means of detecting PCR for detecting PCR from an MPEG transport stream;

fifth means of recording for recording said MPEG transport stream and said PCR;

means of controlling records for having said MPEG transport stream recorded by said fifth means of recording;

means of controlling reproduction for having said MPEG transport stream reproduced from said fifth means of recording; and

means of managing PCR location information for managing a location where said PCR is recorded as PCR location information,

characterized in that:

said means of detecting PCR detects PCR from the MPEG transport stream recorded in said fifth means of recording and makes it recorded by said fifth means of recording; and

on reproducing said MPEG transport stream, based on said PCR location information, said means of managing PCR location information adds PCR to the head of said MPEG

transport stream reproduced by said means of controlling reproduction.

25. The recording and reproducing apparatus according to any one of claims 19 to 24, characterized in that said PCR has a cyclic counter value, and a cyclic counter value of PCR added to said MPEG transport stream keeps continuity with a cyclic counter value of PCR included in said MPEG transport stream.

26. The recording and reproducing apparatus according to any one of claims 19 to 24, characterized in that said MPEG transport stream to which PCR is added has its contents rewritten.

27. A recording and reproducing apparatus according to claim 25, characterized in that a cyclic counter value of PCR added to said means of adding PCR is rewritten in compliance with a cyclic counter value of PCR originally included in said MPEG transport stream so as to keep said continuity.

28. The recording and reproducing apparatus according to claim 26, characterized in that a cyclic counter value of PCR originally included in said MPEG transport stream is replaced in compliance with a cyclic counter value of PCR added to said means of adding PCR so as to keep said continuity.

29. The recording and reproducing apparatus according to any one of claims 1 to 28 having a random access function.

30. A medium having a program and/or data for having all or part of the functions of all or part of the means of the present invention described in any one of claims 1 to 28 executed by a computer, characterized by being processible by a computer.

31. An aggregate of information, characterized by being a program and/or data for having all or part of the functions of all or part of the means of the present invention described in any one of claims 1 to 28 executed by a computer.

ABSTRACT

There is a PSI receipt waiting time of two seconds or so from a start of decoding of an MPEG transport stream to actual display of AV data. There are provided first means of recording 3 for recording a predetermined signal discretely including additional information of a program; means of controlling records 2 for having said predetermined signal recorded by first means of recording 3; means of controlling reproduction 4 for having said predetermined signal reproduced from said first means of recording 3; means of detecting PSI 1 for detecting program specific information (PSI) from said predetermined signal; and means of adding PSI 5 for adding said PSI to said predetermined signal.

Fig. 1

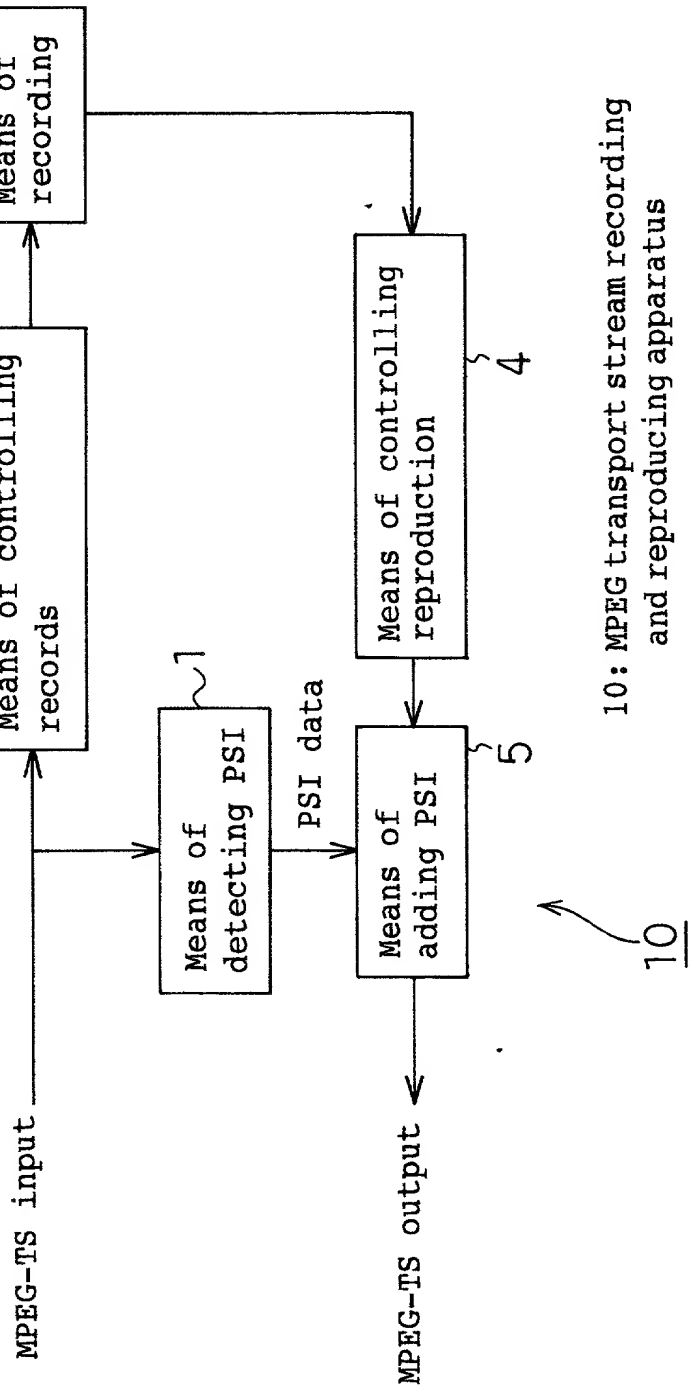

MPEG-TS input
Means of controlling records
2
Means of recording
3
Means of detecting PSI
1
PSI data
Means of controlling reproduction
4
Means of adding PSI
5
MPEG-TS output
10
10: MPEG transport stream recording and reproducing apparatus

Fig. 2 (a)

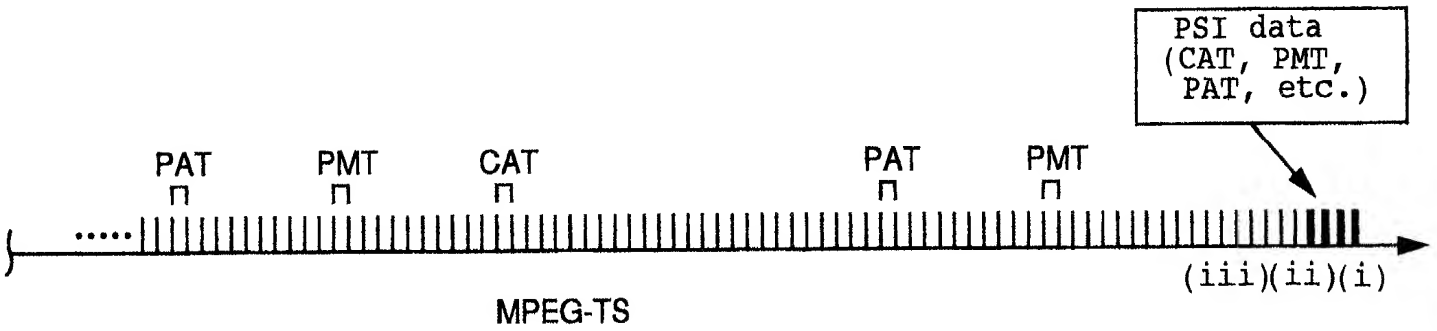


Fig. 2 (b)

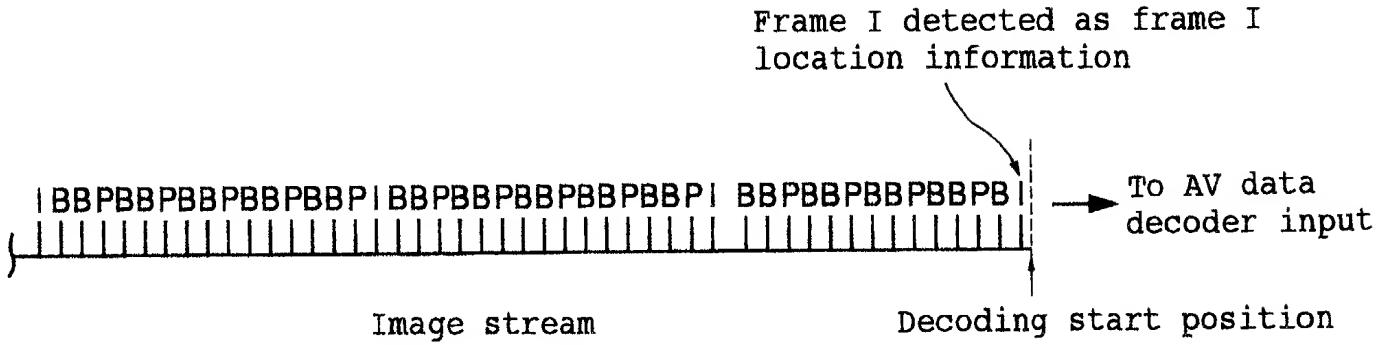


Fig. 3

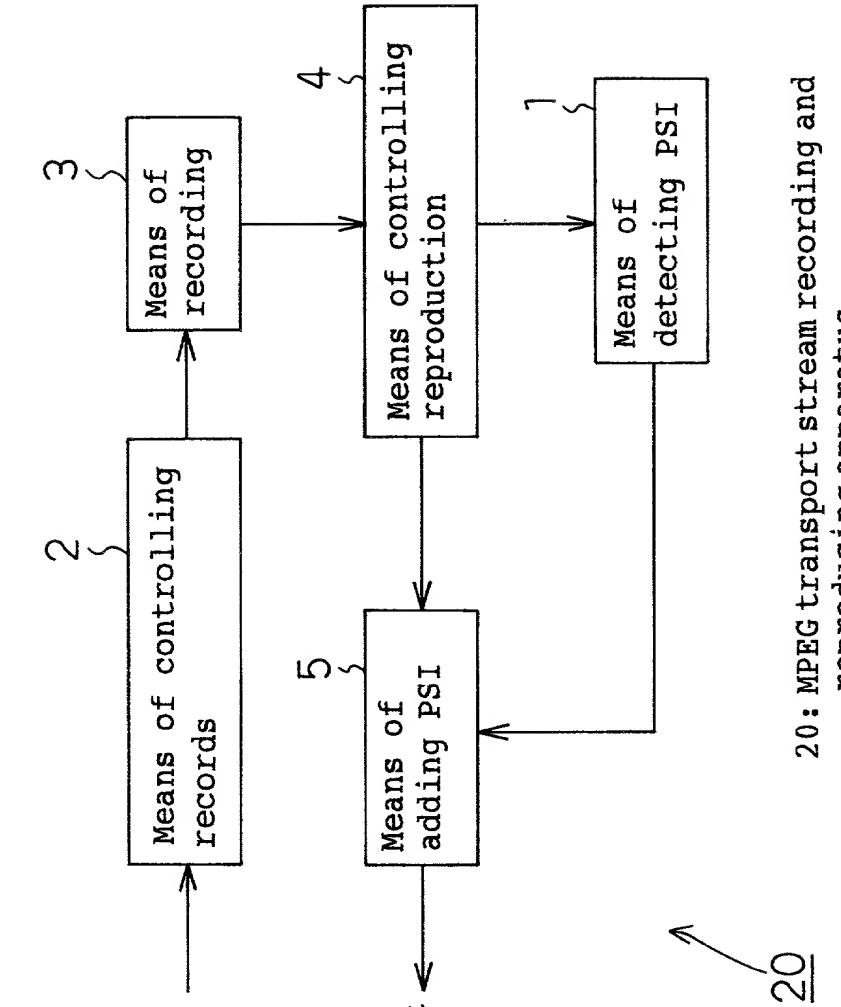

MPEG-TS input
2
Means of controlling records
3
Means of recording
4
Means of controlling reproduction
5
Means of adding PSI
1
Means of detecting PSI
MPEG-TS output
20
20: MPEG transport stream recording and reproducing apparatus

Fig. 4

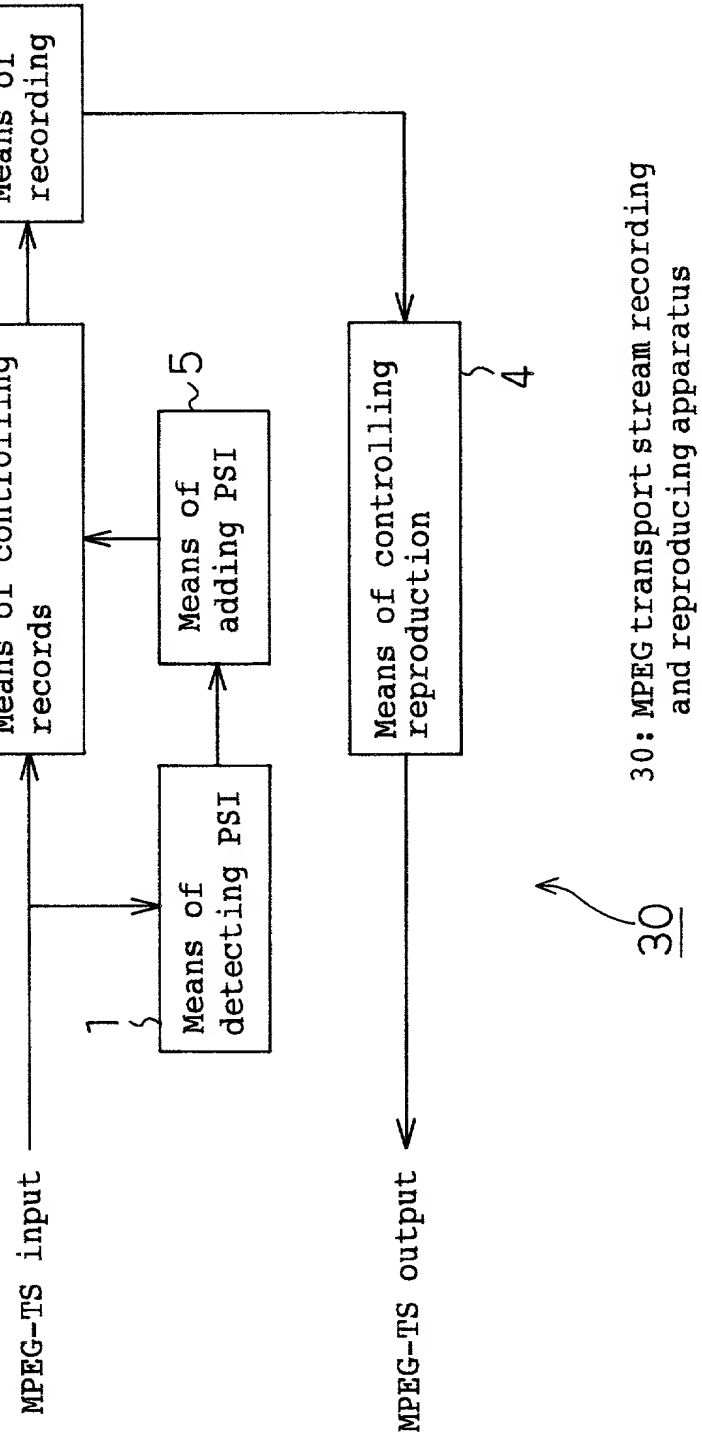

MPEG-TS input
1
Means of detecting PSI
2
Means of controlling records
3
Means of recording
5
Means of adding PSI
4
Means of controlling reproduction
MPEG-TS output
30
30: MPEG transport stream recording and reproducing apparatus

Fig. 5

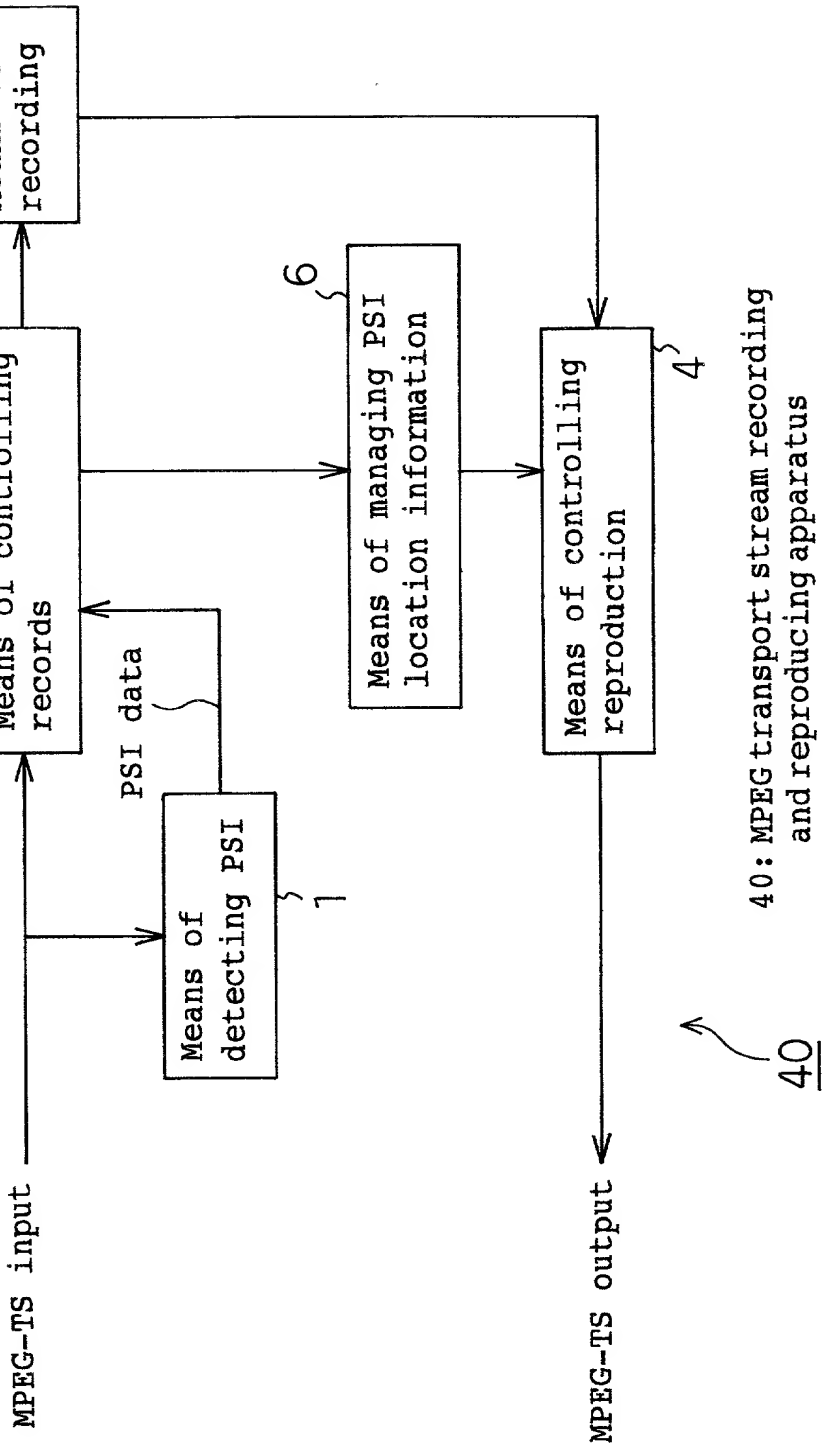

MPEG-TS input
Means of detecting PSI
1
PSI data
2
Means of controlling records
3
Means of recording
6
Means of managing PSI location information
4
Means of controlling reproduction
MPEG-TS output
40
40: MPEG transport stream recording and reproducing apparatus

Fig. 6

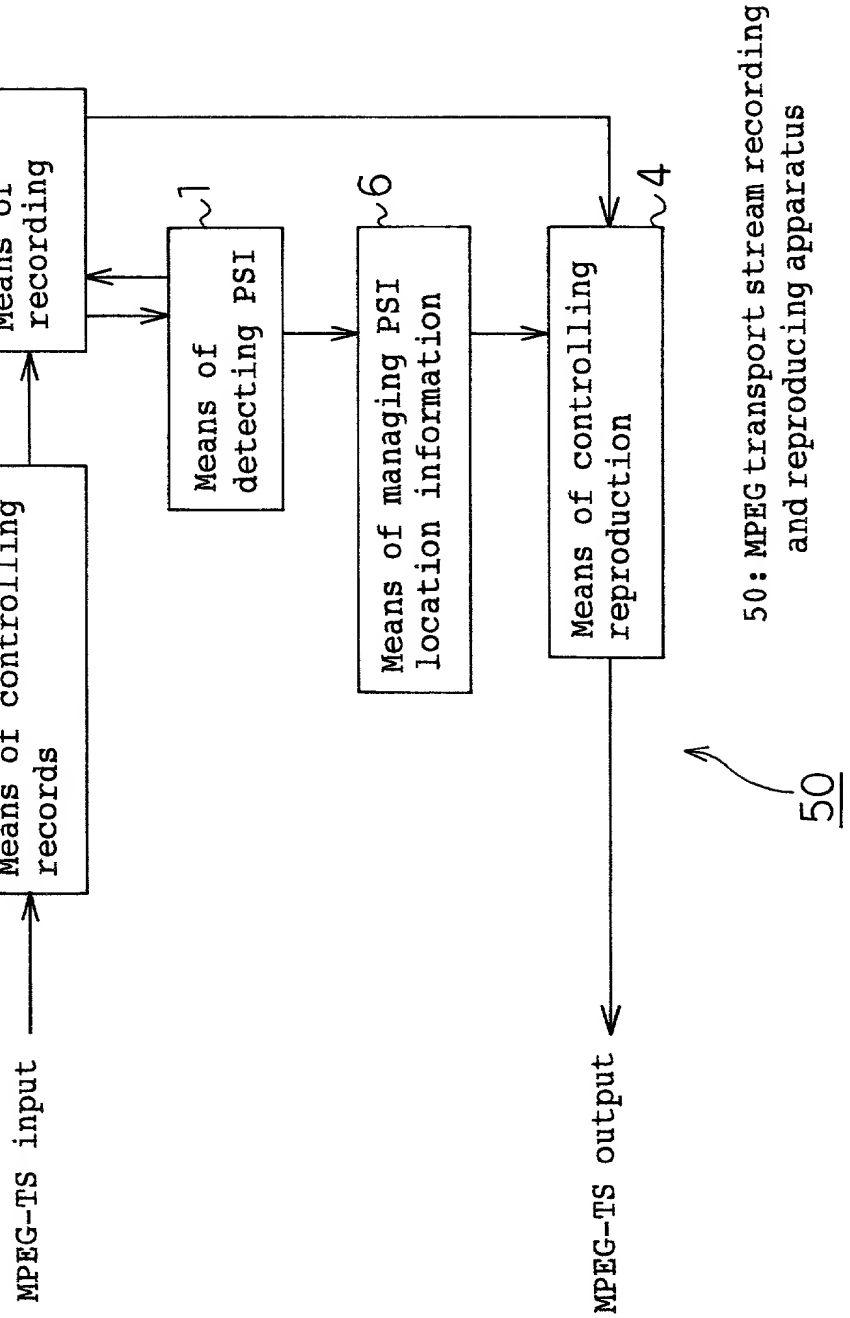

MPEG-TS input
2
Means of controlling records
3
Means of recording
1
Means of detecting PSI
6
Means of managing PSI location information
4
Means of controlling reproduction
MPEG-TS output
50
50: MPEG transport stream recording and reproducing apparatus

Fig. 7

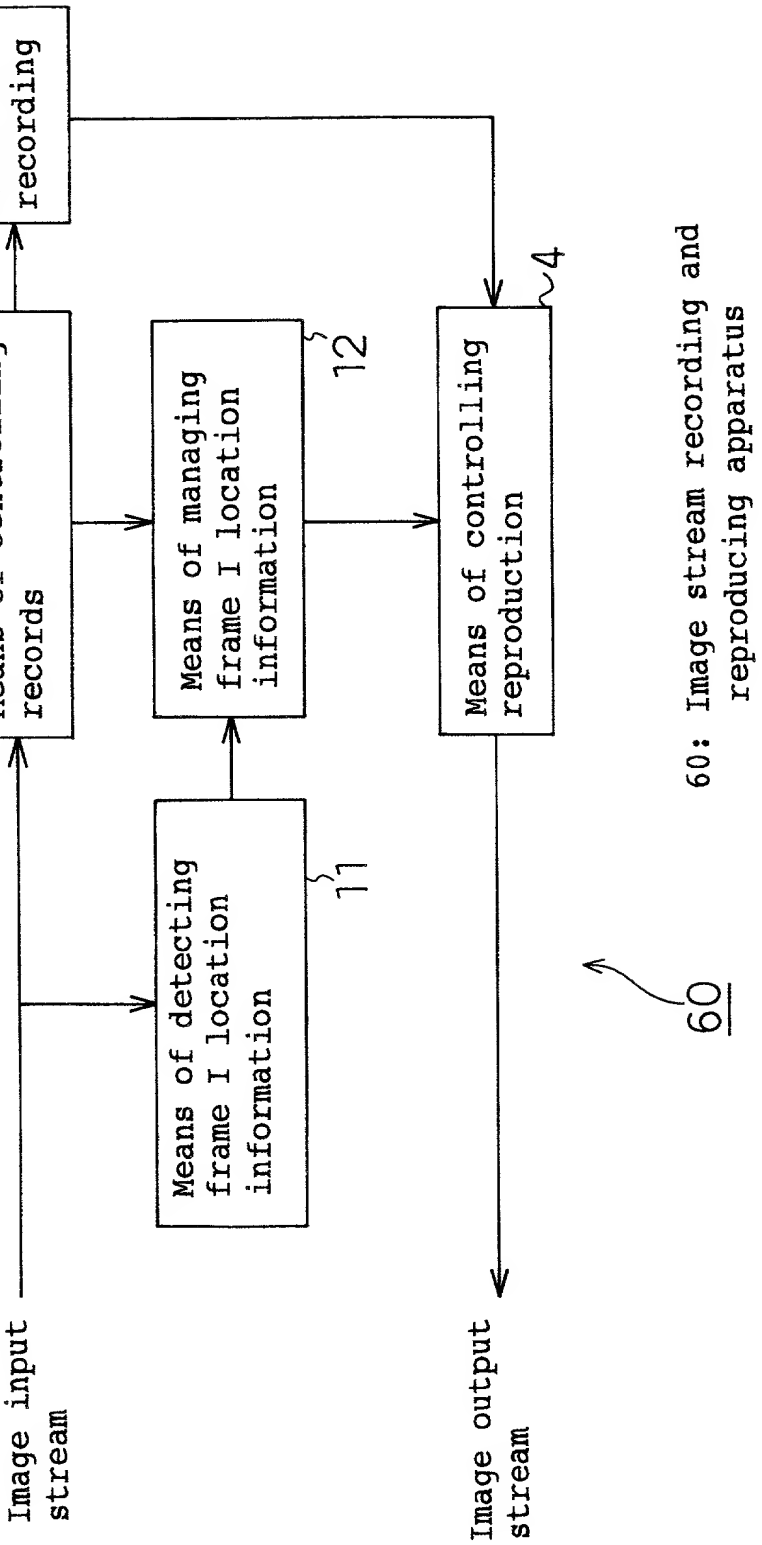


Image input stream
Means of detecting frame I location information
11
Means of managing frame I location information
12
Means of controlling records
2
Means of recording
3
Means of controlling reproduction
4
Image output stream
60
60: Image stream recording and reproducing apparatus

Fig. 8

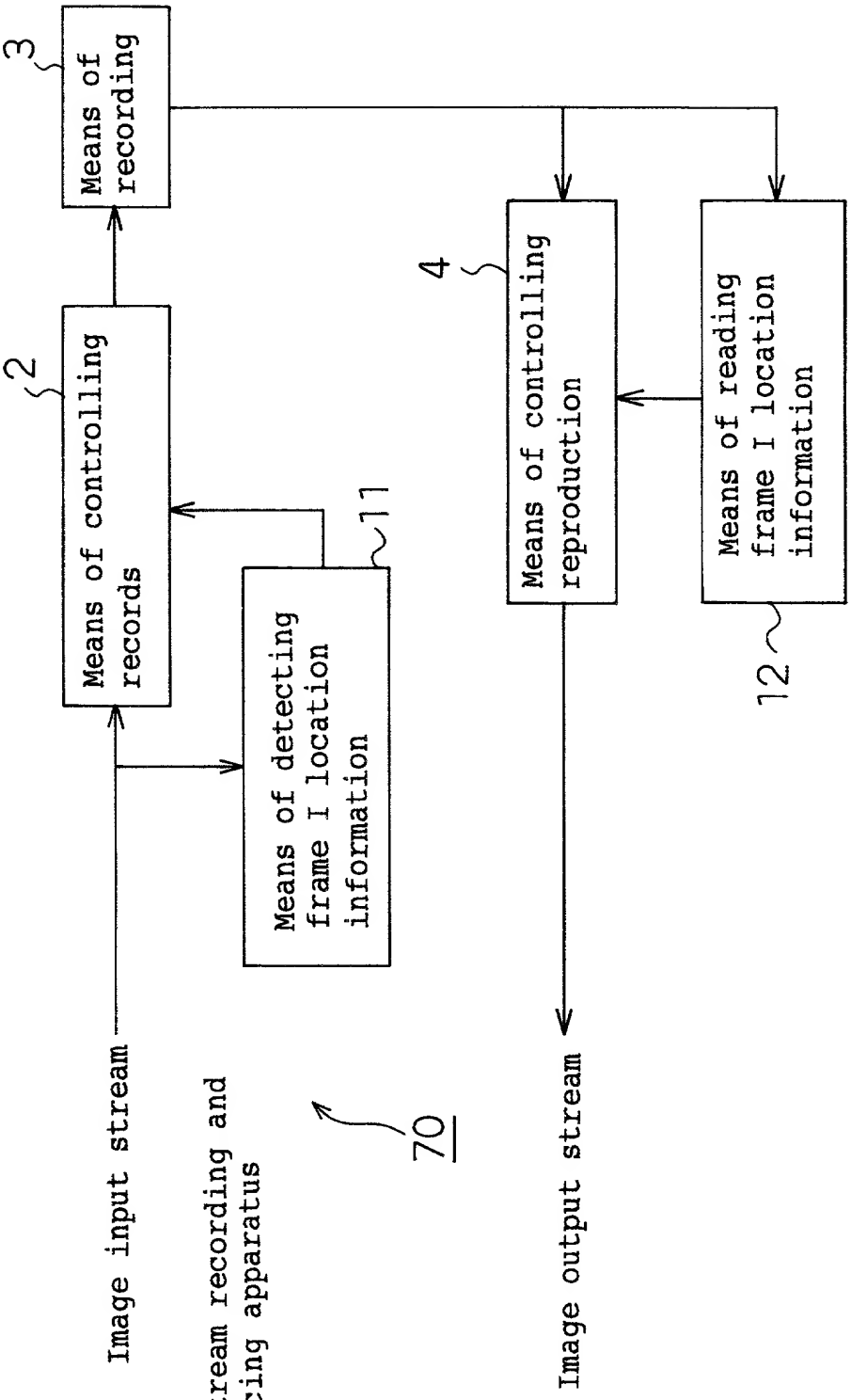

3
Means of recording
2
Means of controlling records
4
Means of controlling reproduction
Means of reading frame I location information
12
11
Means of detecting frame I location information
Image input stream
Image output stream
70
70: Image stream recording and reproducing apparatus

Fig. 9

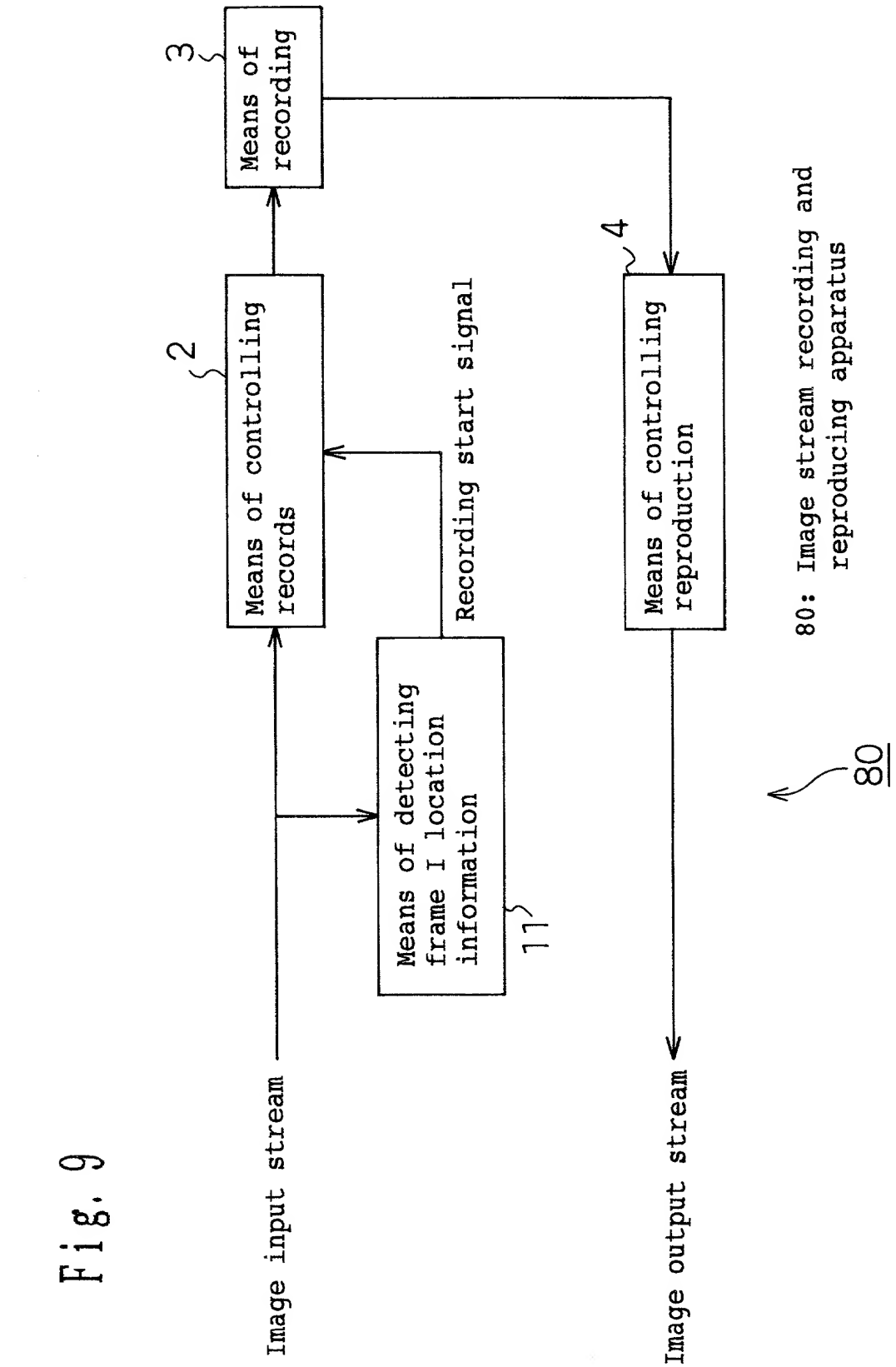

3
Means of recording
2
Means of controlling records
Recording start signal
4
Means of controlling reproduction
Means of detecting frame I location information
11
Image input stream
Image output stream
80: Image stream recording and reproducing apparatus
80

Fig. 10 (a)

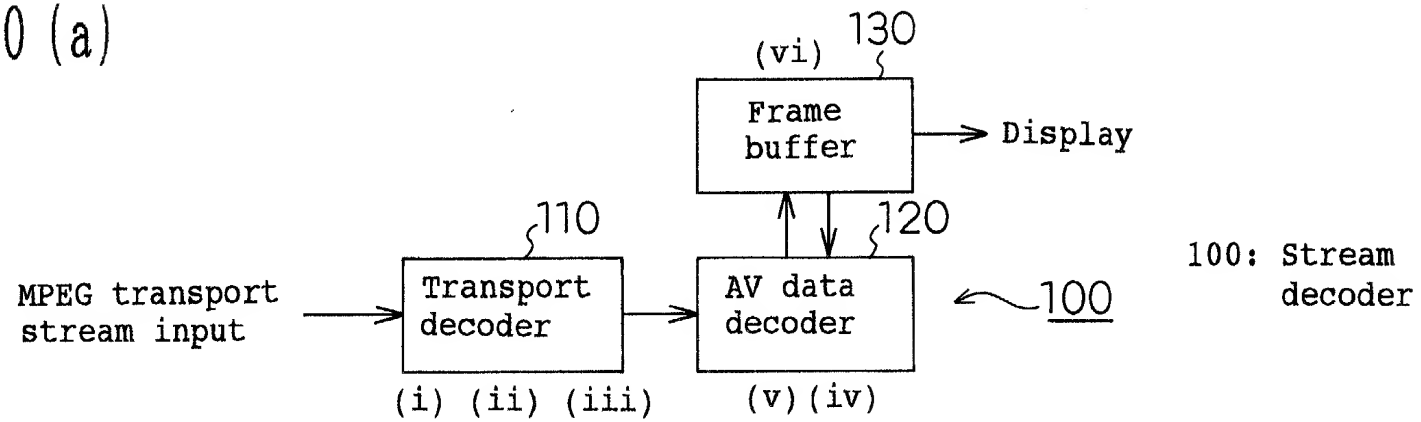


Fig. 10 (b)

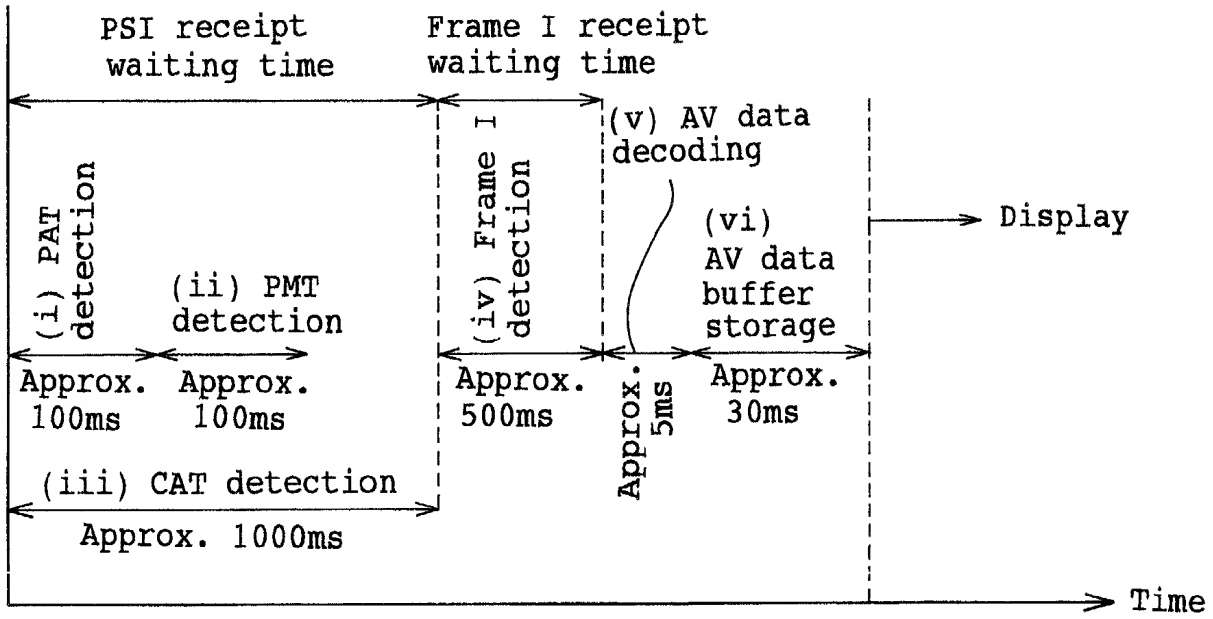


Fig. 11 (a)

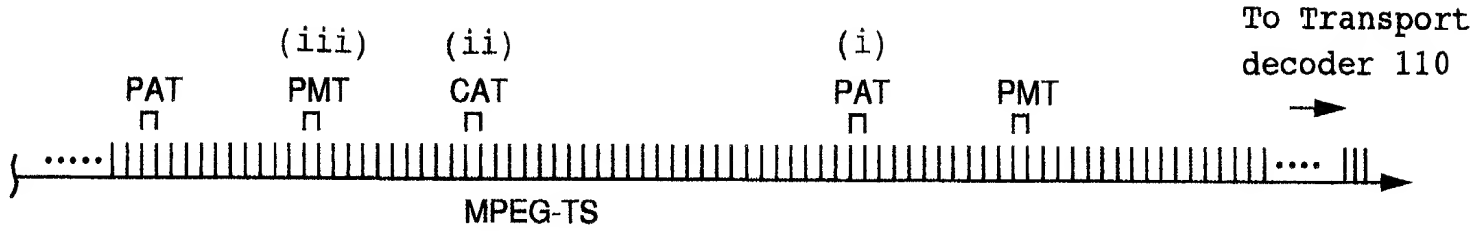


Fig. 11 (b)

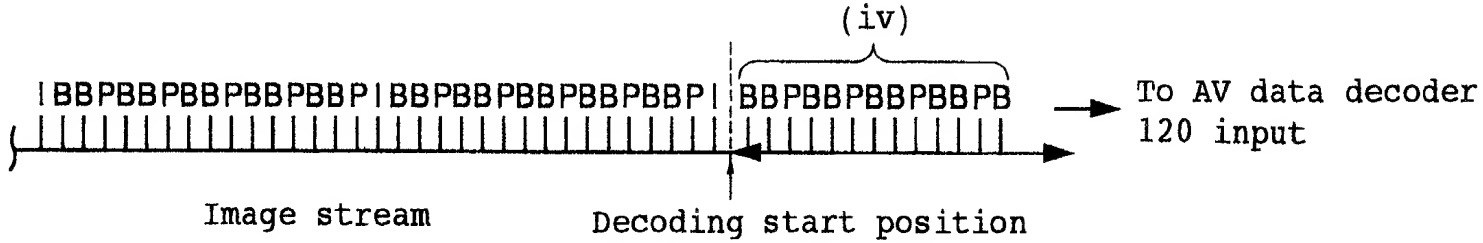


Fig. 12

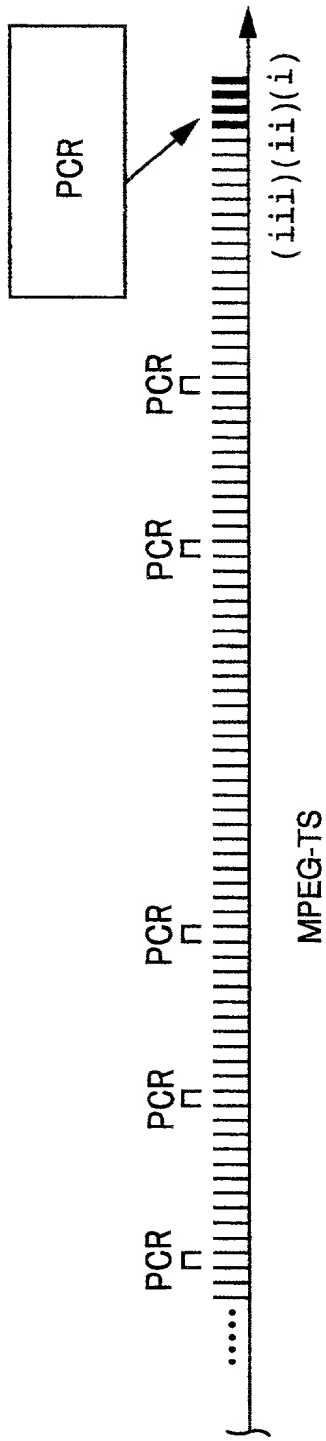
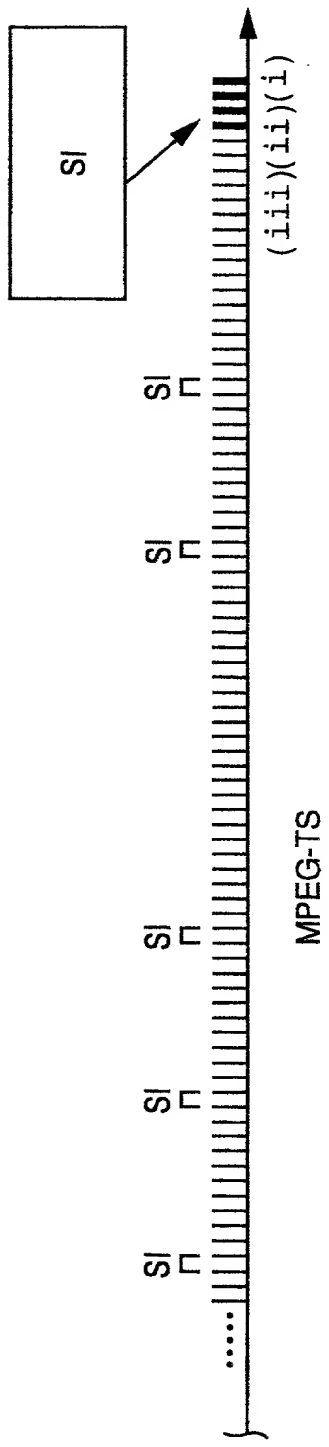


Fig. 13



Declaration and Power of Attorney For Patent Application
English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled RECORDING AND REPRODUCING APPARATUS, MPEG IMAGE STREAM RECORDING AND REPRODUCING APPARATUS AND MEDIUM the specification of which is attached hereto unless the following box is checked:

☒ was filed on 05 June 2000 as
United States Application Number or PCT International Application Number PCT/JP00/03620
and was amended on_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Not Claimed
Hei11-160,076	JAPAN	June 7, 1999	☐
(Number)	(Country)	(Day/Month/Year Filed)	
_____	_____	_____	☐
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____	_____
(Application Number)	(Filing Date)
_____	_____
(Application Number)	(Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Citizenship _____

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Fifth inventor's signature _____ Date _____

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Citizenship _____

Post Office Address _____

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Full name of sixth joint inventor, if any (given name, family name) _____

Sixth inventor's signature _____ Date _____

Residence _____

Citizenship _____

Post Office Address _____

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Full name of seventh joint inventor, if any (given name, family name) _____

Seventh inventor's signature _____ Date _____

Residence _____

Citizenship _____

Post Office Address _____

_____